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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a Year 15c a Copy July 19, 1930

LOOKING PLEASANT

Unusual Close-up Photograph of Kansas Tornado

(See page 34)

Vol. XVIII No. 484

Punch Here to Fit Science News-Letter Binder Cover

Early Christians Held Pagan Wake

Archaeology

Feasted at Grave; Gave Corpse His Share

EVIDENCES of a half-pagan "wake" held by early Christian citizens of Cologne at the grave of a departed companion have been turned up in an extensive excavation of an ancient Roman estate at Cologne-Müngersdorf, under the direction of Dr. Fritz Fremersdorf of the Wallraf-Richartz Museum of Cologne. The find shows, in the opinion of the discoverer, that the early converts along the Rhine were not quite sure of their new religion, and maintained a sort of pagan "rear guard" in their minds when it came to the serious matter of dealing with the dead.

The Roman estate at Cologne-Müngersdorf had its own cemetery, in which were a number of stone sarcophagi. Several Christian symbols, especially two large spoons inscribed "Deo gratias," attest to the religion of the occupants. But outside of one of the sarcophagi, at the foot of the grave, was a collection of bottles, cups and dishes which show pretty plainly that a regular "wake" was held at the open grave, and that the feasting mourners gave the corpse his full share. The cups show rings, where the wine or other beverage slowly dried to the bottom, and in several of the bowls there are pieces of bone.

In one of the bottles Dr. Fremersdorf found the skulls of two field mice and seven shrews, which are small, mouse-like animals that live on insects. At first he was inclined to believe that the animals had crawled into the bottles to get at the contents and then found themselves trapped. But this theory failed to hold water; no skeletal bones were there, nothing but the skulls; morever, the shrews, being insectivorous, would not have been attracted by any kind of prepared food or drink. Quite evidently the skulls were placed there, but for what superstitious reason there is as yet no hint.

Another bit of evidence of lingering paganism was found under another of the sarcophagi. Before the heavy stone coffin was lowered into the earth, a fowl was sacrificed and laid upon the bottom of the grave, together with a short, broad-bladed knife, a glass cup and a pottery saucer. This is reminiscent of the "foundation sacrifice" of a fowl, practised widely in pagan Europe whenever a new house was built. It survived through the middle ages, and some traces of it persist in isolated localities to the present day, Dr. Fremersdorf says. The usual incantation was, "Let all the harm that might come to this house be laid upon this hen," and it is quite likely that something of the kind was done at the edge of a new grave outside of Cologne fifteen centuries ago.

Science News-Letter, July 19, 1930

New Fish Highways

IT HAS been an accepted theory among sportsmen and commercial fishermen that salmon always return to spawn in the river where they were hatched and from where they traveled out to sea. Of course they usually do.

Last year a six-mile commercial aqueduct was opened; it empties into Grays Harbor, Wash. At the spawning time this spring numbers of salmon entered the great pipe at the point where it pours its fresh water into the bay and they traveled the six miles to where the pipe begins in an artificial lake. The fish were seen entering the pipe and were later found in the lake. There was no other way for them to have gotten there. According to the water superintendent there are now thousands of baby salmon in the lake.

Ichthyology

Science News-Letter, July 19, 1930

The Answer Is

In This Issue

Why was a *fowl* placed in ancient German *graves?* p. 34—What is a *filterable virus?* p. 35—Do patients often die of *"creeping paralysis?* p. 35—How does *fever* help a sick person? p. 36—Does one *disease* ever drive out *another?* p. 36—How can you see *solar prominences* when there is *no* eclipse? p. 38—How can we obtain samples of *atmosphere* 50 miles up? p. 42—How *high* has a rocket ascended? p. 42—How does the *autogiro* differ from the *helicopter?* p. 43—What possible new *use* is there for *mullein?* p. 45—Who was *Sennacherib?* p. 46—Where will the *Soils Science* Congress meet? p. 46—Who will buy striking *photographs* of scientific subjects? p. 48.

Twister Poses

PERHAPS the finest photograph ever taken of a tornado—certainly at any rate a most unusual one—was obtained by Ira B. Blackstock, a Western railroad executive, at Hardtner, Kansas, on Sunday, June 2, 1929, at about 4:30 p. m. Mr. Blackstock let the windy monster approach as closely as he dared, standing with one foot in the entrance of a cyclone cave while he waited for the right moment to snap the shutter. The white spots at the bottom of the picture, as reproduced on the cover of this issue of the SCIENCE NEWS-LETTER, are very large hailstones that accompanied the storm.

Meteorology

Science News-Letter, July 19, 1930

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

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Ultramicroscope Finds Tiniest Germ Yet Seen

Microscopy—Medicine

MEN and women of science working patiently together in the small, obscure neurological laboratory of the Westminster Hospital in London, England, claim to have discovered the smallest disease germ ever seen by the human eye. In doing so they believe they have paved the way to the conquest of some of the most mysterious and terrible diseases afflicting mankind.

The organism they declare they have isolated, identified and photographed is thought to be that of multiple sclerosis—commonly called "creeping paralysis"—once a rare disease in this country, but now not at all uncommon.

The germ is one of a group known as the filterable viruses, which are so minute they will pass through a porcelain filter, which catches all hitherto discovered organisms. Hitherto, these have remained invisible even under the most powerful microscopes. They include the forms of parasitic life causing infantile paralysis, encephalitis (sleeping sickness), measles, small-pox, and some of the most deadly diseases of animals, such as distemper among dogs and pleuro-pneumonia among cattle.

This information is vouched for by Dr. Foster Kennedy, professor of neurology at the Cornell University Medical School and attending physician in charge of nervous diseases at Bellevue Hospital, New York City. He returned from abroad a few days ago after carefully reviewing the work done in the Westminster Hospital laboratory.

Some of the leading physicians in New York City, when told of Dr. Kennedy's report, said such an announcement from a physician less distinguished than Dr. Kennedy would be regarded sceptically, but that his guarded and qualified statement must be given the most serious consideration. Further research, according to Dr. Kennedy, will be required to confirm the discovery. He was reluctant at this time to allow any announcement to be made publicly.

In revealing what has been done, he said it was the first time to his knowledge that the ultra-microscope perfected by J. E. Barnard, a London hatter, had definitely revealed the organism of a filterable virus.

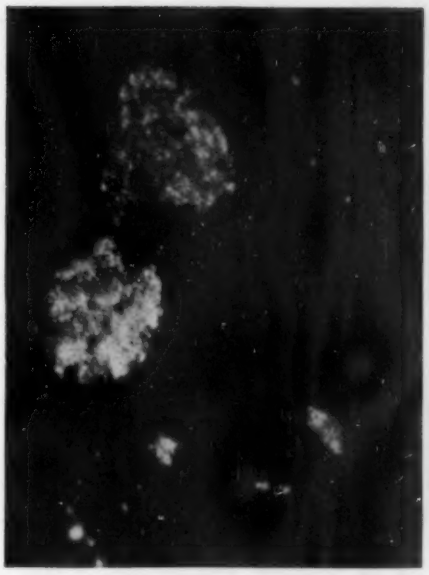
Dr. Kennedy reported that under the enormous magnification of 1,800 diameters glistening globules which seem to have life now can be seen and photographed. These are definitely claimed by Sir James Purves Stewart, neurologist of the Westminster Hospital, and Miss Kathleen Chevassut, the highly skilled technician who has actually conducted the experiments, to be the organism responsible for "creeping paralysis."

"While it is seldom wise to make positive predictions," Dr. Kennedy said, "it is quite possible that this work will lead to the discovery of the organisms causing measles, infantile paralysis, sleeping sickness, distemper among dogs and pleuro-pneumonia among cattle."

He recalled that in 1925 Mr. Barnard, who had cooperated with Dr. William E. Gye of London, announced that his ultra-microscope had revealed the organism of chicken cancer. At that time Dr. Max Cutler of the Memorial Hospital in New York associated with the Cornell Medical School and was sent to England to check up the work of Barnard and Gye. His report did not confirm their announcements.

But this time, so important does Dr. Kennedy consider the results attained, an ultra-microscope has been ordered from Mr. Barnard, and Dr. Lewis Stevenson, neuro-pathologist, has been sent over to work in the Westminster Hospital laboratory until he has mastered the technique of Miss Chevassut and can reproduce her experiments. He will then return and attempt to repeat them in the new neurological laboratory of Bellevue Hospital.

"If this can be done," declared Dr. Kennedy, "we shall feel reasonably sure that the organism causing multiple-sclerosis has been discovered, and that we may be on the way to developing a serum with which to treat the disease. At present, I can only say that the work thus far is very hopeful. The experiments have been conducted with the utmost care, but until the same results can be obtained under entirely different surroundings—not simply in other London laboratories—we must consider the work as tentative only."



Smallest germs ever seen by human eye as revealed by the ultramicroscope. These tiny germs, which are here magnified 1,800 times, cause creeping paralysis, known scientifically as multiple sclerosis.

"Creeping paralysis" some years ago was considered a rarity in America, Dr. Kennedy explained. Today it is fairly common. At almost any time a half-dozen cases can be found in the wards of Bellevue Hospital. Its most marked symptom is a progressive inability to walk. It is characterized by episodes of weakness, from each of which a marked recovery is made, although the patient is left slightly weaker each time until paralyzed.

Yet a patient rarely dies of the disease. Dr. Kennedy says he has personally seen only two deaths that appeared to be directly due to it. A patient may be virtually helpless over a long course of years. Strangely, blond, blue-eyed people seem to be most susceptible. It also seems to be selective as to age. Dr. Kennedy says he has never seen a case in a person less than sixteen years old and very rarely after the age of forty.

Hitherto, the principal clinical evidence has been the hardening of disc-like patches upon the nerves. Sclerosis means (*Turn to page* 44)

A famous engineer in charge of a great research laboratory has made a discovery that physicians are now using to help cure a hitherto almost hopeless disease. He noticed that workers with short wave radio transmitters frequently have fever.

His scientists then harnessed these radio waves, the same that carry speech great distances through the ether, to make them give patients much or little fever whenever desired. And the fever, without injuring the patients, kills the germs that cause the disease.

Radio Waves Cause Fever In Patients To Cure Dreaded Paresis

Medicine—Electricity

By Jane Stafford

"HELLO, Australia!" Young America is speaking over a short wave radio set made in America by youthful hands and brains. Through 12,000 miles to the far-off kangaroo land the mysterious vibrations of the high-frequency radio now carry voice, laughter and greeting to fellow radio "hams."

Look into this research laboratory. There are the same radio tubes. But there is no cheery conversation between continents. White-gowned physician and assistants are experimenting with a new device for the treatment of disease. The same short radio waves that carry messages across oceans, intensified and localized, produce promising effect upon animals and man.

When these radio waves pass through the body they raise its temperature, producing a fever. Artificial fever is one of the latest methods of modern medicine for treating disease. Doctors have been trying to find a satisfactory way of producing such a fever and now scientists think they have found it in the short radio waves that link continents.

Heat, applied on the outside of the body, has long been used in the treatment and relief of disease. But fever has always been considered a sign of disease, like pain. When the patient had fever, the treatment was planned to reduce it and so make him more comfortable.

During the last few years this idea has been somewhat reversed. Fever, at least in some conditions, appears to be one of the body's means of defense against the invading disease germs. For example, it is now known to cure general paralysis, or paresis, which was a nearly hopeless condition until a few years ago. If the sufferer from paresis is given malarial fever as well, he has a good chance to recover from the more terrible paralysis. The heat of the fever apparently kills the spirochetes causing the paralysis. Then the patient can be given quinine which kills the malaria germs.

However, there is a drawback to this method. It is hazardous to give a man a disease like malaria. Medicine is not infallible, and occasionally physicians have been hard put to it to clear up the malaria after the original paralysis had yielded to the fever treatment.

Malaria is a fairly persistent disease, comes and goes, and sometimes, when it seems to have been completely driven out of the system, the patient suffers a relapse and has another attack. All this is very weakening, as well. So physicians looked about for another method of inducing artificial fever that would be hot enough to burn up the spirochetes of paresis, and that still could be controlled and gotten rid of when it had served its purpose.

Out on the Pacific Coast, and elsewhere, continuous hot baths were tried. This was a much safer method than introducing a disease into the patient. The heat could be easily controlled and the fever induced was maintained for some time. Dr. J. Cash King of Memphis and Dr. Edwin W. Cooke of Bolivar, Tenn., have demonstrated that electric current from a diathermy machine also produces a beneficial fever.

The first hint that radio waves might be used came when Dr. W. R. Whitney, director of the research laboratories of the General Electric Company at Schenectady, N. Y., found that men working in the field of a short wave radio transmitter were having fever. Immediately investigators began searching for a method of harnessing this energy and putting it to work at producing this beneficial fever which could relieve sufferers from general paralysis and possibly from other diseases as well.

Powerful radio equipment was made in the Schenectady laboratories, and Dr. Helen Hosmer of Albany Medical College studied its possibilities. In one test with this equipment, a tadpole's temperature was raised twelve degrees. Dr. Hosmer also was able to raise the body temperature of other small animals, and of solutions containing varying amounts of salts. She issued a warning, however, upon the extreme danger of exposing human beings to intense fields of short radio waves until more is known about them.

Now Dr. Charles M. Carpenter and Albert B. Page have perfected equipment with which they have been successful in raising the temperature of the body rapidly to a point where it is of value in treating disease, and without great discomfort to the patient. With extreme caution, after many preliminary trials, they ventured to use this method on actual patients, and found there were no unfavorable effects unless the high temperatures were continued for too long a time.

Their equipment has been constructed on the same principle as a short wave radio transmitter that sends messages across oceans. Instead of an aerial liberating currents carrying messages, this radio set has two aluminum plates called condenser plates which concentrate the electrical energy within the apparatus so that it may be used to elevate the patient's

temperature. The apparatus is enclosed within a case about three feet high, three feet wide and six feet long, mounted on wheels so as to be portable.

The patient is suspended on interlaced cotton tapes stretched across a wooden frame. The under surface of this frame is covered with composition boards, forming an air chamber beneath the body. A cover of the same material is fitted over the frame so that the head of the patient projects through an opening at one end. In this way there is a fairly tight air chamber around the patient as he lies on the tapes.

He rests on his back and the condenser plates, which concentrate the energy that is to produce the fever, are placed at each side of the box so that the radio waves oscillate through his body from one side to the other at the rate of from 10,000,000 to 14,000,000 a second. The distance between the plates can be varied but is generally kept at 30 inches. These plates are covered with hard rubber so as to prevent arcing and consequent burning of patient or attendant.

Two small hair dryers are placed in openings at the foot of the apparatus, one above and one below, so as to circulate hot air around the body. These decrease loss of heat and equalize the humidity throughout the enclosed atmosphere, and thus increase the efficiency of the apparatus and also help to keep the patient comfortable.

The 30-meter waves, the same length used by amateur operators, are produced by a tube familiar to all up-to-date radio fans, the recently developed four-element screen-grid tube. This tube is especially adapted for use at the higher frequencies and has the nominal output rating of a small broadcasting station, 500 watts.

By carefully applying the plates and by enclosing the body, it is heated rapidly without causing great discomfort to the patient. Dr. Carpenter and Mr. Page were able to raise the temperature of the body 5 or 6 degrees Fahrenheit above normal within an hour or one hour and twenty minutes. In one instance the temperature reached 106.5 Fahrenheit. Even higher temperatures could be obtained with this apparatus, the investigators believed, but they have been extremely cautious because of the limited experience with such apparatus and methods.

When the desired temperature is reached it may be held either by decreasing the voltage, by increasing the plate distance or by using only the hot air blowers.

The temperature very slowly goes back to normal if the patient is left in the box and wrapped in heated, heavy woolen blankets. Occasionally a patient feels nauseated or has a headache, but on the whole he does not appear to be greatly distressed or tired when the maximum temperature is maintained for one hour and then allowed to drop to normal while he is well blanketed. The pulse and breathing rate increase and the blood pressure decreases as the temperature rises.

"We believe that the condition of our patients after treatment is much more satisfactory than that reported by investigators who have used other methods to produce artificial fevers," the Schenectady investigators reported.

They explain the rise in temperature when the body is exposed to short radio waves as being due to the resistance of the body to the conduction of a current between the surfaces adjacent to the opposed plates. Other theories have also been advanced to explain this phenomenon.

From their studies of infectious diseases in laboratory animals, these investigators think that two desirable effects are produced by fever. First, the increased heat within the body makes a less favorable environment for the multiplication of a disease-producing virus, because viruses and germs in general only grow and multiply when the temperature is just to suit them, and that is the normal temperature of the human body.

Second, the heat somehow speeds up the development of immunity, perhaps by increasing the rate of the chemical processes concerned with it and the general defenses of the body against infections.

Another scientist who has shown that radio waves could be used to treat paresis is Prof. W. T. Richards of Princeton University. Prof. Richards has worked at the private laboratories of Alfred L. Loomis at Tuxedo, N. Y., but with much less powerful apparatus.

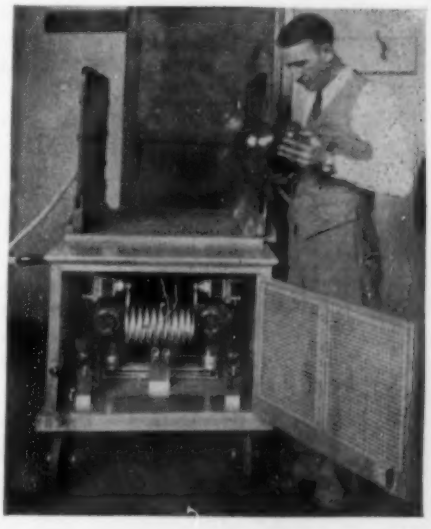
Radio waves have also made a preliminary attack on cancer, although so far the tests have been on animals rather than on human beings. This work has been conducted by the U. S. Public Health Service under the direction of Dr. J. W. Schereschewsky in his laboratory at Harvard Medical School.

Mice with tumors artificially acquired in the laboratory were improved by being subjected to doses of oscillating electricity produced by vacuum tubes similar to those used in radio. The frequencies Dr. Schereschewsky used in his experiments ranged from 8,300 to 135,000 kilocycles per second, a range that expressed in more familiar language corresponds to wavelengths below about 40 meters. The most effective frequencies were found to be at about the middle of the extremes used and more deaths of mice occurred at the high and low ends of the frequency range.

"In a considerable number of instances tumors exposed in this way receded and disappeared with the eventual recovery of the tumor-bearing animal, while in control animals the tumor grew progressively, causing the death of the animal in from four to six weeks," said Surgeon General Hugh S. Cumming in an official report of the work.

One of the disadvantages of the radio method of raising the temperature was that physicians could not be sure just how the patients would heat up. Recently Prof. J. C. McLennan of the University of Toronto and A. C. Burton discovered through tests that the heating is dependent on the conductivity of the material through which the high frequency current is pulsating. (*Turn to page* 45)

With this apparatus, short radio waves are used to induce artificial fever that is beneficial in treating disease, particularly general paralysis or paresis.



Solar Prominences by Daylight —A Classic of Science

Astronomy

PHOTOGRAPHIC INVESTIGATION OF SOLAR PROMINENCES AND THEIR SPECTRA; by George E. Hale. In American Journal of Science, 1891.

When Dr. Hale photographed the solar prominences through a spectroscope slit he allowed astronomers to learn by daily observation the life history of those strange "flames," sometimes many thousand miles in height, which shoot out from the surface of the sun. Before the spectroheliograph, momentary glimpses at times of total eclipse furnished our only information on these constantly shifting clouds of gaseous elements. Dr. Hale, now honorary director of the Mount Wilson Observatory, still studies the sun as seen from his private observatory at Pasadena.

IT is now many years since any important advance has been made in our knowledge of the solar prominences. With the exception of spectrum photographs made at the Siam and Egyptian eclipses, and the momentary glimpses of mysterious "white prominences" during totality, almost nothing has been added to the collection of facts gathered nearly twenty years ago. After Professor Young's vigorous attack upon the chromosphere and prominence lines at Mount Sherman and elsewhere, other investigators seem to have been impressed with the belief that no further additions could be made to the long catalogue of lines drawn up by our most skillful solar observer, and the spectroscopic side of the matter was allowed to rest, though a continuous record has been kept of the forms of chromosphere and prominences. While it is probably true that the most persistent watching would be required to increase the number of known lines in the visual spectrum, it is rather singular that the importance of photography in a study of the ultraviolet has been entirely overlooked. While the positions of spots on the sun's disc are daily recorded by photography, the same cannot be said of the chromosphere and prominences, and even in investigations of the extremely complicated spot spectra, photography has been but little employed, experiments with it not having proved very successful.

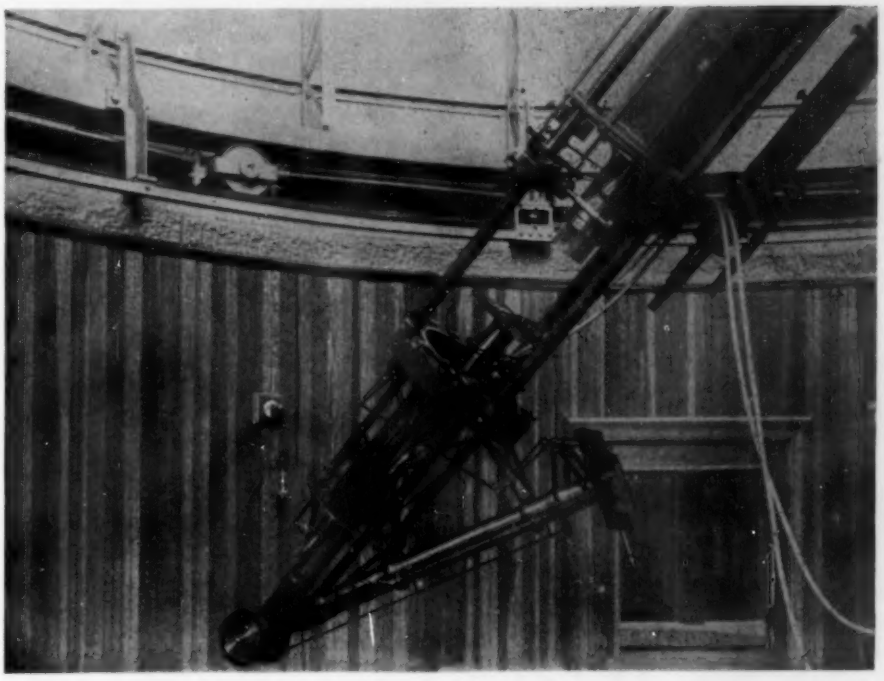
It is unnecessary here to urge the importance of using photographic processes to assist the eye in nearly all classes of solar investigation. What has been said for photography in other fields of astronomical or physical research will apply with equal force in the present instance, and the results of many years speak forcibly for themselves. It is of course very desirable that the ultraviolet should be studied, and for this purpose visual observations are of no service. Again, prominence forms as photographed through different lines should be compared, and the sequel will show that photography affords the only means of investigating the white prominences.

The history of attempts at solar prominence photography extends over twenty years, and it is remarkable that the earliest experiments were the only ones which gave any indications of possible success. In 1870 Professor C. A. Young made the first prominence photographs taken without an eclipse. Using the hydrogen gamma line (G'), and a wide tangential slit, a magnified image of the prominence was formed upon an ordinary collodion plate, and given an exposure of nearly four minutes. Professor Young has very kindly shown me silver prints from the best original negatives; in these only the general outline of the prominence can be faintly seen. This is due partly to a small displacement of the image during the exposure, as the polar axis of the telescope was slightly out of adjustment. The nebulous character of G' makes its use objectionable, but the serious difficulty with this line lies in the employment of a wide slit. The brilliancy of the background of atmospheric spectrum increases very rapidly when the slit is opened, while the prominence itself g r o w s no brighter. Thus the contrast in a photograph is greatly decreased, and the general illumination of the field, due to diffused light from the grating, or fluorescence of the prisms or object glasses, conspires to hide all details of structure. For these reasons the method has never been employed in practice.

It is beyond the scope of the present paper to describe the various methods of prominence photography proposed by Braun in 1872, Lockyer and Seabroke in the same year, Lohse in 1874 and 1880, Zenger in 1879, and Janssen in 1881. Suffice it to say, that in no instance was any success attained sufficient to bring the method into practical use, and in 1889 it was impossible to see where any advance whatever had been made beyond the brief experiments of Professor Young with a simple open slit.

In undertaking an investigation of the subject in the summer of the year last named, the writer devised two methods of accomplishing the desired result with a narrow slit, for it was evident that with any line in the prominence spectrum as then known, the use of a wide slit could not have more than an extremely limited application. In the first method the rate of the driving clock of the equatorial is so changed that the sun's image drifts at right angles across the slit of a spectroscope of high dispersion. At the focus of the observing telescope (of equal focal length with the collimator) a photographic plate moves at the same speed, at right angles to the axis of the telescope, and in the direction of dispersion. A narrow slit just in front of the plate allows only the line in use to fall upon it, and thus prevents fogging. It will be easily seen that fresh portions of the plate will be uncovered as the prominence drifts across the slit, and the result will be a latent image upon the photographic plate.

The second method exactly reverses the operations of the first. The sun's image is held in a fixed position by the driving clock of the equatorial, while the plate at the focus of the observing telescope is also stationary. The slit of the spectroscope is caused to m o v e steadily across the end of the collimator, while a corresponding slit before the plate moves at such a rate



The original Hale spectro-heliograph attached to the 12-inch refractor at the Kenwood Observatory at Chicago.

that the line in use passes constantly through it.

Both of these methods, together with the experiments carried on with the first at the Harvard Observatory and more recently at the Kenwood Physical Observatory, have been already described, and in the present paper I wish to consider especially the results obtained in Chicago within the last few weeks.

In my earliest attempts at photographing the prominence spectrum I was much surprised to find narrow, sharp, bright lines running up through the center of the dark shades of both H and K, apparently to the very top of every prominence. At Mount Sherman in 1872 Professor Young, whose eyes are exceptionally sensitive to the shorter wave-lengths, had been able to see similar reversals of H and K, but the difficulties of observation were so great that he considered it probable that the whole width of each dark shade at H and K was reversed, the eye being able to perceive only the maximum of intensity at the center. Once or twice he noticed a bright line estimated to be about one division of Angström's scale below the central reversal of H, but with the utmost precautions the eye was incapable of any accurate determinations of position or appearance in this part of the spectrum. But with high dispersion and care in manipulation the photographic plate meets with no difficulties, and the lines are obtained with ease. . . .

The important variations in the relative intensities of prominence lines revealed in eclipse photographs have been partially confirmed by my photographs. So far only one prominence has appeared in which the ultra-violet hydrogen lines could be photographed, and this showed a corresponding increase of brilliancy in the visual spectrum. But the H and K reversals are invariably strong, and easily photographed. Preliminary measures show that both lines probably belong to calcium, but this is yet to be definitely determined, and the origin of the broad dark shades in the solar spectrum is decidedly uncertain. In spite of the constant presence of the H and K bright lines in prominences, it can hardly be supposed that the substance producing them can be ordinary hydrogen, for several reasons. In the first place there is no provision for K in Balmer's series, and H certainly does not fall in the position of the hydrogen line, as it is about 1-5 tenth-metre more refrangible. Again, H and K do not follow the hydrogen lines in their intensity variations, and in several cases I have photographed both H and K expanded and reversed over spots in which the C and F lines showed no signs of reversal. Some very recent photographs suggest the possibility that the substance producing the H and K bright lines occasionally ascends in prominences to a higher level than that reached by hydrogen itself (observed through C) in the same prominences, and the "white prominences" observed and photographed at several eclipses offer a most interesting case in point. At the Grenada eclipse of August 29, 1886, Prof. W. H. Pickering found in his photographs made during totality a spiral prominence 150,000 miles high, which had for the only lines in its spectrum H, K and a faint trace of an ultra-violet line about half-way between K and L. There was also a brilliant continuous spectrum in the visible region, but as the usual hydrogen lines were absent, Prof. Tacchini was unable to see the prominence by the usual spectroscopic method, either before or after totality. In his report Prof. Pickering adds: "It is highly probable that a great number of prominences pass by entirely unnoticed, because we rely solely upon visual instead of photographic methods of observation." . . . The various theories connecting sun-spots and prominences are based upon observations in the visual region, and the invisible prominences, which are shown by the Grenada photographs, to reach at times to great elevations, have been left entirely out of account. It will be seen shortly that this need no longer be the case, and we may hope soon to have a daily record of all classes of prominences, both visible and invisible.

When the sharp and brilliant reversals of H and K were discovered at the beginning of my investigations in prominence photography at the Kenwood Physical Observatory, it at once became evident that a considerable advance had been made, for the substitution of either of these lines for the less refrangible hydrogen lines removed the serious difficulty of photographing the longer waves of the C region with short exposure. But apart from their position in the spectrum, the distinctive peculiarity of H and K specially fits them for prominence photography. The narrow bright lines, instead of being superposed on a brilliant continuous spectrum as is the case with all of the other prominence lines, lie in the center of broad, dark bands, where the troublesome light of the atmosphere is missing. Thus both slits used in my apparatus for photographing the prominences could be much (*Turn to page* 46)

Less Anemia

FEWER deaths from pernicious anemia have been reported since the treatment with liver or liver extract has become countrywide, statisticians of the Metropolitan Life Insurance Co. have just found in a survey of vital statistics. This statistical proof bears out the impression of doctors and pathologists throughout the country.

It has been claimed that pathologists in medical schools are hampered in their teaching because they cannot find enough fresh material to show the medical students how this disease affects the various organs and parts of the body. Since the introduction of the treatment by Drs. George R. Minot and William P. Murphy of the Harvard Medical School, the deaths from the disease, and even cases of it, have become comparatively rare in the hospitals.

"Whether the use of liver or liver extracts will result in a permanent lowering of the death rate or only in a postponement of death from the disease remains to be seen from the data of individual case experience for subsequent years," the statisticians said.

Since 1926, when the liver treatment was first introduced, the mortality for whites has been reduced by half between the ages of 55 and 74 years, when formerly the heaviest mortality from this disease occurred.

Health

Science News-Letter, July 19, 1930

Friendly Insects

THE widely heralded war between insects and the human race is only half a picture and therefore a false picture. Insects are also great benefactors to man and all the animals that contribute to his well-being, and in justice they should be recognized as such.

So declared Dr. Frank Lutz, entomologist of the American Museum of Natural History, in a Science Service radio talk given over the Columbia Broadcasting System.

Calling attention to the impossibility of having our present supply of fruit without insect aid, Dr. Lutz proposed a hypothetical question:

"Suppose we had never had any apples, pears, plums, peaches, oranges, strawberries, or anything of that sort. Suppose, however, that a group of strangers brought us delicious samples of a great variety of such fruits and told us that they, the strangers, could make it possible for us to grow all of these things. Suppose that, in return for this possibility which only they could grant, they asked that a twenty per cent. commission be paid to their relatives. Does anyone think that this would be an unfair proposition? I am sure that we would be glad to accept the bargain and then, later, we would try very hard to beat the relatives out of their twenty per cent."

However, distributing pollen is only a part of the work insects do for us. The very soil plants grow in, even plants not dependent on insects for pollenation, is in part a gift of the insects, Dr. Lutz continued. He said:

"Darwin rightly praised the soil-making activities of earthworms and became their most effective press agent. Risking the false impression that I think the value of earthworms is overrated, I would like to point out that ground burrowing insects are more widely—in fact, universally—distributed than are earthworms, that they are more numerous in any given locality and that they are much more active. Furthermore—and this is a generally overlooked fact—an additional reason for their being more effective soilmakers than earthworms is that they carry beneath the surface not only decayed leaves but rich nitrogenous plant-food such as manure and the dead bodies of animals.

"Time will not permit even a sketchy continuation of this line of thought but perhaps you are already about to ask how land plants of any kind ever existed without insects. Others have asked that question and a part of the answer is that geological history shows that there was no extensive growth of land plants and no flowering plants at all before insects became well established on earth."

Entomology

Science News-Letter, July 19, 1930

Man of Gardar

WHAT manner of man was the Man of Gardar?

Was he a surviving neanderthaloid type, thousands of years out of his time in the Middle Ages? Was he a freak Eskimo, living with the dwindling colony of Norsemen on the unfriendly coast of Greenland in the twelfth or thirteenth century? Or was he a degeneration type, arising from the inbreeding of a malnourished group of white men cut off from the rest of the world?

These questions have been roused by the recent discovery in the medieval Christian cemetery at Gardar, southwest Greenland, of a most extraordinary skull, that has many of the characteristics of the low-browed, heavy-jawed Neanderthal race that inhabited mainland Europe scores of millenia ago. The find was made by Prof. F. C. C. Hansen of the University of Copenhagen, and is discussed in the scientific journal *Nature* by Sir Arthur Keith, noted anthropologist.

Sir Arthur is inclined to look upon the strange skull as the result of a disorder of growth, somewhat like the fairly common and distressing type of giantism known as acromegaly. This disease is due to a glandular failure, and frequently results, says Sir Arthur, in the assumption, "in a bizarre form, of all the characteristics of the skulls of ancient fossil man—particularly Neanderthal and Rhodesian characters.

"*Homo gardarensis* must have been the subject of a disorder of growth—the kind of disorder which causes giantism in man, but whereas in most giants growth soon becomes irregular, in *Homo gardarensis* it remained regular."

Paleontology

Science News-Letter, July 19, 1930

IN VARIOUS CI

Fighting Wasps

WASPS have a strong racial feeling. They will welcome strangers belonging to their own species, even though they come from nests many miles away. But if a strange wasp of a different species alights on the nest it means instant battle.

This in outline gives the results of experiments on wasps in a number of nests which Phil Rau, of Kirkwood, Mo., hung up in his third-floor laboratory and studied in greater intimacy than most of us would want to bestow on the slim-waisted "hot-tails."

Mr. Rau's collection contained three species of the genus *Polistes*. He found that in general if an insect of a given species were transferred to a nest of the same species it would either be welcomed by a committee of the "home folks," or at the very least be let tolerantly alone, to make itself at home if it chose. Sometimes a stranger wasp would become a permanent member of its host colony.

A wounded wasp introduced into a strange colony of its own species would frequently receive apparently solicitous attention from its sister in-

CIENCE FIELDS

sects. They would lick its injuries and massage its body and wings.

As an extreme case, Mr. Rau pinned to one nest a dead wasp of the "right" species which had been kept for several years in a museum case in an atmosphere saturated with creosote vapor. Most of the wasps paid no attention to the mummy. A few made mildly hostile gestures and then became indifferent. But one determined female apparently had opinions of her own about the strange-smelling intruder, for she attacked it furiously and was not content until she had bitten off both its wings. Then she retired and treated herself to a most elaborate and lengthy toilet.

When a wasp was placed in a colony of a different species, there was no friendly welcome nor even an indifferent toleration. Everybody was up in arms at once, and the stranger usually got very short shrift unless she were lucky enough to escape. The intruder would instantly become the center of a mass of struggling, biting, sting-thrusting insects.

Their hostility was just as great against the dead body of an alien as it was against a living insect. The same mummified, creosote-flavored wasp that roused the antagonism of only a single individual in a nest of its own species produced a general riot when it was pinned on the nest of either of the two other species.

Entomology
Science News-Letter, July 19, 1930

Blindfold Ball

THROWING a ball at a goal with a blindfold bandage over your eyes is no longer in the class of childish party games like pinning the tail on the donkey. Athletes at the University of Illinois have been set to practising this very stunt of tossing a basket ball at a basket, blindfold, with the practical and scientifically sound purpose of learning to "feel" the correct shot.

The blindfold test was given to nine members of the freshman varsity squad by Prof. Coleman R. Griffith, psychologist and director of athletic research at the university. Prof. Griffith is a pioneer in the field of athletic psychology. From this experiment he has concluded that any basket ball player must develop the sense of "feel" before he can acquire any skill at sending the ball just so far and no farther.

Prof. Griffith observed that missed shots were more frequently caused by errors in distance than errors in direction. Ordinary practice will not tend to correct the former and more serious type of inaccuracy, he concluded.

The tests showed that an incorrect position at the foul line will result in the player shooting either to the right or left. This type of error is easily corrected by a slight change in the throwing stance so that neither arm dominates the direction of the shot. The distance errors were more frequent after a two-hour workout.

In commenting on this Prof. Griffith said, "The results are in line with ordinary expectations. The more difficult and complicated skills are the first to disintegrate under the effects of fatigue."

Psychology
Science News-Letter, July 19, 1930

Replacing Cotton

RAYON and other synthetic cellulose fabrics will soon be underselling cotton goods as they are now underselling silk. So prophesies Prof. Charles E. Mullin, head of the division of textile chemistry at Clemson College. One company, he states, has already announced that it can produce viscose yarn at a lower price than that of medium or fine cotton yarns of the same size.

"While this economic development in the field of yarns is of considerable interest to the synthetic fiber manufacturers, due to the fact that it apparently widens the sales and manufacturing possibilities enormously on the basis of price alone, it is not nearly as good news for the cotton growers and spinners," Prof. Mullin comments. "Already in China, Japan and some other countries the manufacturers of the cheaper real silk materials are complaining of the inroads of the synthetic yarn fabrics on their sales, and as soon as the price of the synthetic yarns drops to near that of the cotton yarns of the same size, the same will be true in the case of cotton goods."

Synthetic fibers are competing with silk not only in price but also in fineness, Prof. Mullin has found. It is now possible to produce filaments that are two and one-half times finer than those of true silk. These are being made on a commercial scale both in America and abroad. It requires more than 4,225 miles of one of these filaments to weigh a pound.

Chemical Engineering
Science News-Letter, July 19, 1930

Saved from Modernism

VERULAM, metropolis of the early Britons in the days of Imperial Roman conquest, is to be safeguarded permanently against suburban real estate developments and other archaeological calamities. Officials of the modern city of St. Albans, which stands close by the old Romano-British city, have bought almost one-half of the famous site. The land will be reserved as a public park, and the remains of buried walls and buildings will be sought by scientific excavations.

Verulam was an important capital of a powerful tribe in southern Britain when London, nearby, appears to have been nothing more than a cross-roads trading post. The Romans conferred upon Verulam the highest civic status possible, calling it a municipality.

Ruins of a theater were excavated at Verulam in 1847, and so far as is known this was the only town in Britain that acquired a Roman theater. A portion of the forum was excavated in 1898, but official buildings which probably stood near the market center are yet to be unearthed. The city appears to have continued in existence for four or five centuries after the Roman conquest.

Excavations are to be started this summer. Because of Verulam's special importance, there are hopes that the site will add materially to knowledge of city life in early Britain.

Archaeology
Science News-Letter, July 19, 1930

Avocados from Hawaii

WITHIN another year, export of alligator pears from Hawaii is expected. The latest developments in fighting the fruit fly menace on avocados there will soon result in the lifting of the present prohibition against exportation of the product.

Dr. E. A. Back, of the U. S. Department of Agriculture, was the first to try refrigeration on fruits affected by the fruit fly in 1916 with fair results. He predicted that with this treatment for about three months, the pears will no longer be carriers of living fruit fly larvae.

Dr. Back also expressed the belief that there is great hope for the hard-shelled variety grown there because of the resistance against the puncturing apparatus of the fruit fly.

Agriculture
Science News-Letter, July 19, 1930

Rockets to Go to Unknown Heights

Astronautics

Prof. Goddard Resumes Experiments At Camp Devens

FROM a small depression in a remote corner of Camp Devens, near Worcester, Mass., where thousands of American soldiers trained during the war, there will soon echo sounds of explosions reminiscent of war-time artillery practice. But the sounds will not be of big guns. They will be from rockets sailing upwards from a steel tower to heights that cannot be predicted with certainty. Perhaps their greatest altitude for some time to come will be measured in only thousands, or even hundreds, of feet, but from them scientists are looking forward to the time when they will be able to explore heights above the earth far greater than any reached by airplanes or balloons. Perhaps eventually travel to the moon or even to other planets will become possible by a development of such rocket experiments.

The Camp Devens experiment is part of the work of Dr. Robert H. Goddard, professor of physics at Clark University. Dr. Goddard is one of the pioneer students of this form of locomotion. It was in 1912, while at Princeton University, that he began his researches. In 1914 he went to Clark, where he has worked ever since. Much of his work has been done with the assistance of the Smithsonian Institution and later of the Carnegie Institution of Washington. In 1919 the Smithsonian Institution published his first report on his work in which he outlined his theories and experiments.

Referring to this report, Dr. C. G. Abbot, secretary of the Smithsonian Institution, said recently: "Professor Goddard's basic inventions of 1914, whereby he applied the correct angle gas orifice; his later successful introduction of continuously burning liquid propellants; and his mathematical theory, published by the Institution in 1919, form the foundation on which important events in the exploration of the air will probably depend."

So important have been Dr. Goddard's researches, and so much do they promise, that now a grant has been made to him by Daniel Guggenheim in order that he may continue them with adequate facilities.

The Goddard rocket is essentially the same as the Fourth of July pyrotechnic, in that it is propelled by the recoil from the discharge of gases. This is quite different from the way an airplane is propelled, for example, which depends upon an actual push against the atmosphere. As a result, the rocket will work just as well outside the earth's atmosphere as in it; in fact, since the air causes a certain amount of resistance, it would theoretically work better in a vacuum. Professor Goddard has perfected a liquid propellant for his rocket which has many advantages over gunpowder or similar explosives. As this burns up as it is used, the rocket continually becomes lighter. In scientific exploration of the upper atmosphere, above the present altitude records, instruments would be carried up, and a parachute would bring them safely to earth after the charge had been exhausted.

Dr. Goddard does not promise when he will be able to send rockets up to these great altitudes. The only ones he has fired so far are small affairs, which have only ascended a few hundred feet. Similar rockets will be fired from the Camp Devens station, though increasingly higher and higher altitudes should be attained. He compares his present experiments with the first efforts of the Wright brothers, who flew only a few feet, but whose work laid the foundation for the present high development of the airplane.

After the rocket is perfected, scientists expect that many present-day puzzles will be solved. It will be possible to study the spectrum of the sun without the screening effect of the ozone layer 50 to 75 miles above the earth, which cuts out a large part of the solar radiation. Knowledge will doubtless be gained of the Kennelly-Heaviside layer, the ionized stratum in the atmosphere that makes possible long distance radio. Samples of the atmosphere from these high altitudes may be brought down for analysis, and it may prove that at these heights what rarefied atmosphere there is consists mainly of hydrogen and helium instead of oxygen and nitrogen. And then, in the far distant future, perhaps, the scientists foresee the time when they can actually send a rocket to the moon, 240,000 miles away, or even to one of the other planets, millions of miles distant. But there are more immediate practical considerations that justify the expenditure of time and money on the experiments.

Pyramid Peels Like An Onion

Archæology

THE Aztec pyramid at Tenayuca, that "peels like an onion," has revealed a new surprise in its innermost layer. Like a nest of boxes, three pyramids have been located, each built over the last, and now the original, inner structure turns out to be two.

Mexican archæologists discovered the third layer when they attempted to run an exploratory tunnel through the heart of the layered pyramid. When a third nucleus was struck, they diverted the tunnel around this original building to locate its entire plan. This has revealed the apparently twin nature of the pyramid's heart. The oldest building proves to be straight-walled like modern structures, not sloping of wall like typical Aztec pyramids.

It is believed that the original structure was enlarged by a side addition. If this is correct, it means that five stages of human habitation may be counted at Tenayuca. The second pyramid also represents two stages, since it shows signs of having been remodeled and redecorated at some time after it was originally built and used.

Several idols have been found in the earth-and-rock fill which was piled on the inner structure in building pyramid two. These are pronounced not Aztec in style, and much more primitively made. One, about a foot high, is believed to represent a warrior figure in tunic and rudimentary headdress of plumes. His cast of feature suggests the art of the Totonac, a race which inhabited the Gulf state of Vera Cruz and which had some affiliation with the Mayas of southeast Mexico.

Helicopter Models Perform Well

Aviation

But Full Size Craft Present Greater Difficulties

IF a full-sized, vertically rising aircraft worked as well as its small-sized models, airplanes and airships would be readily discarded while many types of the new craft would carry thousands through the air.

The new Curtiss-Bleecker helicopter, somewhat different from old machines, is now subject to test. The Cierva autogiro, of which scores have been built, has been said to be "suffering from growing pains" by Pitcairn engineers who are conducting research on it. All are experimental machines and must change and develop greatly, but their engineers have the success of models to encourage them.

The inspiring performance of models only a few feet in diameter have enabled struggling inventors to impress financiers and get money with which to carry on their experiments. But when such craft are made large enough to lift real people instead of miniature humans, there arise many unforseen difficulties of construction which do not affect the building of models.

Lifting ratios greater than 100 pounds per horsepower are frequently achieved in models, Dr. H. L. Dryden, authority on aerodynamics of the U. S. Bureau of Standards, told a Science Service representative, but only a fraction of a horse-power is applied and very little weight is lifted. The energy usually comes from a twisted rubber band.

If such ratios held for man-sized craft, a wonder world of air transportation would be opened up. However, difficulties of mechanical construction multiply and laws of aerodynamics become more severe as the size of vertically rising craft is increased.

The rotating surfaces of models can be made very light and do not require the structural bracing necessary in real machines, Dr. Dryden pointed out. It is very difficult to design this bracing to combine strength and light weight.

The rotating wings of models can be turned much faster than those of the big machines because ability to rise depends more on circumferential speed at the wing tip than on revolutions per minute. Hence to attain the same circumferential speed a small propeller must make more revolutions than a large one. This speed is easily reached in models by elastics or clockwork, but is very difficult to gear high-speed gasoline aircraft motors down to about 130 revolutions per minute for the big machines. A heavy, clumsy system of gearing is necessary and much power is lost.

This difficulty has been partially overcome in the Curtiss-Bleecker helicopter by propellers on each rotating wing.

In spite of the fact that the large rotating wings seem awkward and clumsy, they have been found the only solution to the problem of how to rise vertically, Dr. Dryden said.

As propeller speed is increased the power required rises much faster than the force pulling upward. Expressed by the aerodynamic law, power is proportional to the cube of the speed and thrust to the square of the speed.

The rotating surfaces must be large because they take the place of wings of the usual airplane, he continued. Their linear speed must compare with airplane speed and yet is limited by fast increasing power.

"A vertically rising machine is after all an airplane with rotating wings," Dr. Dryden explained. "In fact, an engineer once designed one which consisted of two airplanes attached to opposite ends of a beam and facing in opposite directions. The affair was supposed to rise by revolving about the middle of the beam, and once in the air the two machines were to face in the same direction and travel like airplanes. Though I never heard of an actual trial, it well illustrates the principle of vertically rising aircraft."

The autogiro is unlike the helicopter in that its rotating wings which exert vertical lift are driven indirectly by the backwash from an ordinary airplane propeller. It has an airplane fuselage. The helicopter has no airplane fuselage or propeller and its rotating wings are powered directly.

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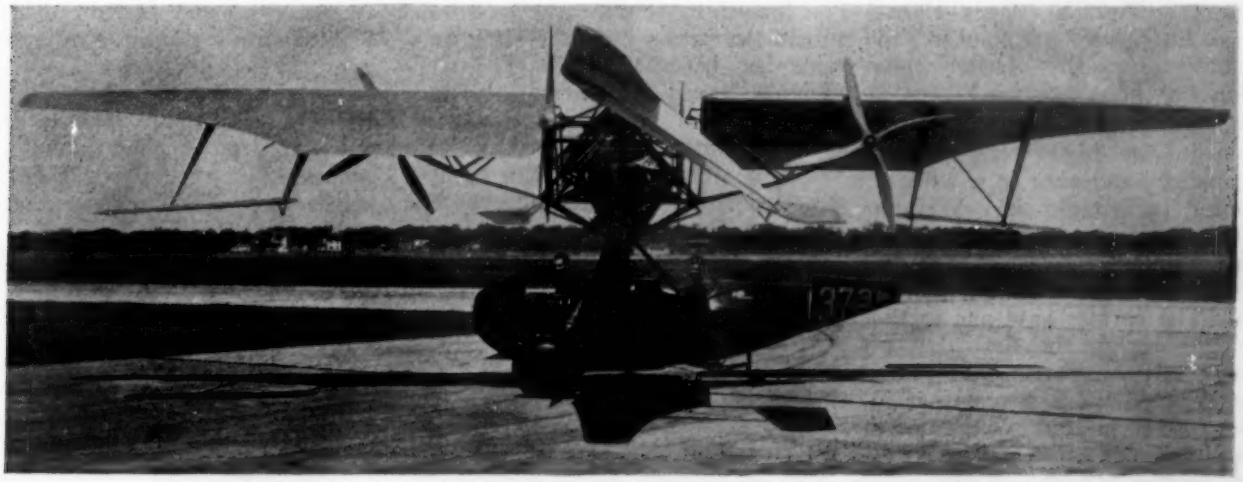
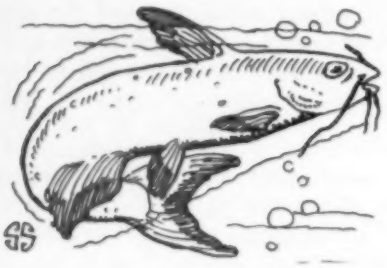


The latest helicopter with its 27-year-old inventor, Maitland B. Bleecker in the front cockpit. The world will soon know whether it can fly. Curtiss-Wright is reported to have spent $200,000 developing it.

Nature Ramblings

By Frank Thone



Mississippi Catfish

TWO or three successive fishermen in the Presidential chair have given so much advertising to game fish, especially trout, that we are in some danger of forgetting that after all a fish's chief function is not to be caught but to be eaten. There are a good many fish that sportsmen do not bother about, that still make capital objects for the prowess of trenchermen.

High rank among these should be accorded to the great catfish of the Mississippi river and its larger tributaries. He is not the abject groveller in the mud that many of his lesser cousins are (though even these humble fish are good food); he is a big, bold, free swimmer in the turbid, soupy waters that are his home. Though he may not understand the delicate arts of fencing like a trout or bass, he makes up with weight and sheer brawn what he lacks in skill, and can give a couple of men in a skiff a lively scrap if they are looking for one.

And after the cook has performed his offices upon the big catfish carcass, never expect a proper riverman, be he white or colored, to come away from the platter while anything but bones remain!

Three-foot catfish are nothing uncommon in the big rivers of our central valley, and once in a while a five-footer is brought in. Writers as diverse in time and gifts as Pére Marquette and Mark Twain have devoted their pens to the Mississippi catfish. The former saw one in the Mississippi during the first day of his immortal voyage on that river, and he devoted more space to it in his diary than he did to the great stream itself.

Science News-Letter, July 19, 1930

Hydraulic Study to Save Millions

Hydraulic Engineering

MILLIONS of dollars will be saved the United States government as the result of a $350,000 investment in an hydraulic research laboratory at the Bureau of Standards, H. N. Eaton, now in charge of this work at the Bureau, said in a radio talk presented by Science Service over the Columbia Broadcasting System.

The savings will be effected, he declared, in the work now planned on flood control on the Mississippi and other rivers, in dams, waterways and irrigation projects. Billions of dollars will be spent in carrying out these plans, so the saving of even a small fraction will be a great gain to the country.

Appropriation of the funds for the hydraulic laboratory has recently been made by Congress and the plans for establishing it are now being considered by an advisory committee of leading engineers.

Describing the immediate financial value of the laboratory, in addition to its academic interest, Mr. Eaton said:

"We have already embarked upon the extension of our inland and coastal waterways at a probable cost in excess of $500,000,000. Flood control of the Mississippi and other rivers will cost us many hundreds of millions of dollars during the next decade. The immense Boulder dam on the Colorado river is to be constructed at a cost of $165,000,000. Consideration is being given to the construction of the Nicaraguan Canal at a cost undoubtedly in excess of $500,000,000. In addition, immense sums are being expended every year in irrigation projects, on hydroelectric plants and on water supply projects.

"Obviously all means which will permit a saving of even a small percentage of the cost of these huge projects will mean the saving of millions of dollars. This can be done with the aid of the hydraulic laboratory.

"The investigations conducted in its experimental flumes furnish more exact information to the designers of hydraulic structures and enable them to effect economies through the more accurate knowledge of the processes of flow with which they have to deal. Tests on models of proposed structures point out the most effective design, give added assurance that the structures will function as planned and indicate how maintenance costs can be reduced."

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Smallest Germ Viewed by Eye—*Continued*

hardening — multiple-sclerosis, many hardenings. These patches increase in number as the disease progresses.

Aside from the development of Barnard's ultra-microscope, the detail of technique which seems chiefly to be responsible for the discovery is the making of cultures in a completely sterile atmosphere. A chamber a little smaller than an egg crate is exposed to short wave lengths—ultraviolet rays—until the air it contains has been sterilized. The technician's hands and arms also are sterilized and introduced into this chamber through a device which prevents contamination. Hitherto, research with the ultra-miscroscope has been inconclusive because it has seemed impossible to obtain uncontaminated cultures. Miss Chevassut's technique appears to be a great step forward in this direction, and to have made the isolation of "creeping paralysis" germs possible.

A blood serum known as Hartley's broth is used for the cultures. Virus from the cerebro-spinal fluid of persons suffering from the disease is introduced into the culture tubes in the sterile chamber and the tubes are closed and incubated.

When the cultures are examined under a magnification of 1,800 times, spherical globules in clusters appear. When separated they have two motions, one a Brownian movement or very rapid vibration associated sometimes with inert matter under very high magnification. The other appears to be a longer oscillation comparable to the movements of some living bacilli. The apparent organisms are too small to take a stain and can be seen only on a dark field with direct illumination. As yet no nuclear material is evident.

But the fact that these forms are discovered only in the virus taken from persons suffering from the disease and that they appear to multiply in cultures, suggests very strongly that they are the first organisms of a filterable virus the human eye has seen and identified.

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Search For Poisonous Plants

Entomology

POISONING the water to catch fish is illegal in almost all civilized countries, as well as in many of the lands of the sun that have become the "white man's burden"; yet the leading governments of the world are now engaged in a zealous search for the most efficacious of the plants used as fish poisons by savage peoples. In a bulletin of the Royal Botanic Gardens at Kew, England, F. N. Howes, well-known British botanist, summarizes the knowledge so far obtained.

These fish-poisoning plants are desired not for poisoning fish but for fighting insect pests. The artless savage takes insects for granted, but the more advanced nations of Europe, Asia and the Americas, dependent for their food on the highest efficiency of agriculture, fight the devouring hordes with every weapon they command.

A chief dependence has been arsenical sprays. These are very effective, but some insect pests have developed resistant strains that can swallow considerable quantities of arsenic without suffering harm. Hence the search for new kinds of poisons.

Fish poisons made from plants have been found highly efficient substitutes. Dilutions of one part in a million or more of water are fatal to insects, usually on mere contact. Derris, an East Indian plant, or rather group of plants, is already in considerable use. It is proposed to spray for several seasons with arsenicals, then for several with derris or one of its relatives, thus catching the arsenic-immune strains that may have evolved with something to which they are not immune.

Most of the fish-poison plants thus far experimented with are of tropical origin. One of the most promising recent additions is the South American "cube," pronounced "koo-beh." Both derris and cube, together with the majority of other fish-poisoning plants, are members of the legume family, relatives of clover and peas. It is proposed to grow them as fertilizer crops in rubber groves and other tropical plantations, thus obtaining two paying crops off the same land with the same labor, and enriching the soil at the same time.

But many other fish-poisoning plants belong to other plant families. One which used to be used in southern Europe is the common mullein, which is now thoroughly naturalized in America as well. If mullein turns out to be an efficient insecticide, its cultivation should present no particular problem, for it is the rankest kind of a weed.

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Radio Fever—*Cont'd*

Prof. McLennan and his associates made their tests on chemical solutions similar to those contained in living things. As a result of their tests, physicians will be able to tell just what wavelengths to use to produce fever in any part of the body. There is one optimum wavelength for heating a material of given conductivity to the greatest degree.

The liver, heart and other parts of the body have different conductivity for these short waves, the scientists found. Taking advantage of this fact, physicians may be able to aim the high frequency treatments at a special organ or part of the body that needs heat treatment.

Scientists point out that the effective amounts of radio waves used in the cancer investigations and also in the production of the artificial fevers are far larger than could be obtained from radio broadcasting. There is little likelihood of beneficial or harmful radio waves entering the home along with political speeches, jazz or other radio programs of today.

Science News-Letter, July 19, 1930

Honors for Fliers

BY special congressional action, all members of the Alaskan Aerial Survey expedition, which mapped nearly 13,000 square miles of wild country in that region in June, July, August and September, 1926, are expected soon to be given the distinguished flying cross by the Navy Department. A bill providing for this honor has been passed by the House and is on the calendar of the Senate awaiting its turn.

Each plane was in the air about 180 hours during the mapping and each plane flew about 18,000 miles, over mountainous, largely uninhabited country. No safe landing places were available excepting on a few small lakes which were seldom accessible and from these take-offs could not have been made, states a report made to Congress by the naval committees of both houses.

Officials of the Department of Agriculture and the Department of Commerce recommended the awards, and told of the value of the work done in inventorying national forest resources, and locating power sites.

Aviation

Science News-Letter, July 19, 1930

To Excavate Big Assyrian Mound

Archæology

Americans Will Search Palace of Biblical King

THE University of Pennsylvania Museum and the American School of Oriental Research in Bagdad have joined in equipping an archæological expedition which will carry on excavations in a hitherto little known section of Kurdistan, in northern Mesopotamia, Horace H. F. Jayne, director of the University Museum, has just announced.

"The site which has been chosen for excavation," Mr. Jayne states, "is known as Tell Billa, one of the largest and most imposing mounds in the land of ancient Assyria. It is situated about fifteen miles northeast of Mosul and about five miles east of the famous ruins of Khorsabad.

"Tell Billa first attracted the attention of Dr. Speiser in 1926 when he was making an archaeological survey of northern Iraq. A surface examination disclosed that the huge mound contained extensive remains of the prehistoric period, going back to the original inhabitants of Mesopotamia and the neighboring regions of the Near East. Furthermore, the historical period is also well represented.

"The site is of particular archæological interest in that a fragment of an inscribed brick picked up on the mound bore the seal of Sennacherib, the Assyrian king of biblical fame, making it clear that the Tell contains one of the summer palaces of the great ruler.

"Sennacherib reigned in Assyria from 705 B. C. to 681 B. C. He laid unsuccessful siege to Jerusalem, his army being decimated by a plague in 689 B. C. He razed Babylon to the ground. It is the fall of Sennacherib's army before Jerusalem that Byron celebrates in his poem 'The Destruction of Sennacherib.'

"Tell Billa was occupied from about 4000 B. C., till the fall of the Assyrian Empire in 606 B. C. It is likely, therefore, to yield sculptures from the Golden Age of Assyrian art as well as prehistoric remains of the aboriginal population of the land. In any case it is certain to furnish important scientific information relative to the early history of Mesopotamia."

The expedition, which will begin work in November of this year, will be headed by Dr. Ephraim A. Speiser, assistant professor of Semitics at the University of Pennsylvania, and the staff will include Dr. C. S. Fisher, who has been engaged in archæological research for the past thirty years, Dr. S. N. Kramer, who holds a fellowship from the American Council of Learned Societies, and A. H. Detweiler, an architect.

Science News-Letter, July 19, 1930

Solar Prominences—*Continued*

more widely opened, without the difficulty of fogging and loss of contrast experienced with the other lines. The result was that the first photograph made in this way proved a success. The prominence drifted slowly across a narrow tangential slit, and behind the second slit, at the focus of the observing telescope, a small cylinder with its axis parallel to the slit, carried a strip of sensitive film at a speed equal to that of the moving solar image. A smooth and uniform motion of the cylinder was produced by a small clepsydra. The photograph showed the form of the prominence very well, and with considerable contrast. It was then concluded, on account of the great width of the dark shades at H and K, that for prominences of not too great size (the image of the sun on the slit plate is two inches in diameter) it would only be necessary to use a wide slit, and give a short exposure. . .

Although this method will serve to photograph the invisible prominences it is evident that there are two objections to it. In the first place it would be very troublesome to find invisible prominences, and to do so it would be necessary to take a large number of photographs with the slit tangent at various points on the limb. This could be remedied by using a curved or ring slit. Again, prominences surpassing a certain size could not be photographed, though for single narrow prominences reaching to a considerable elevation it would be desirable to make the direction of the slit coincide with the direction of the longest axis of the prominence, the direct light from the limb being excluded by a small strip of metal, sliding under the slit. To overcome all of these difficulties I have devised a new form of apparatus, which will much excel the rotating cylinder in ease of adjustment, and allow the use of ordinary glass plates, instead of the celluloid film, which decomposes if kept for any length of time. A new form of clepsydra, of much larger size and with an improved valve, will replace the smaller one before used. The equatorial is also to be supplied with a 12-inch photographic object glass, and a new tube parallel to the old one, so that by a suitable form of cell, either object glass may readily be used on either tube, as the spectroscope is too large and heavy to be easily moved.

Science News-Letter, July 19, 1930

Soil Congress

PREPARATIONS are rapidly being completed for the meeting of the Second International Soil Science Congress in Leningrad and in Moscow, July 20 to 31. During the first six days the sessions will be held in Leningrad, and the rest of the time they will take place in the capital. In addition to the scientific papers and addresses, there will be a series of short excursions into the country around both cities, giving the delegates an opportunity to see various types of soil as they exist in Russia and to observe Russian methods of meeting the technical problems of soil utilization in forest, agricultural and grazing lands, and in the reclamation of marshes and other waste areas.

The Congress will meet under the presidency of one of the most noted of Russian soil scientists, Dr. C. C. Gedroiz. In addition to the large number of Russian workers who will be in attendance, about 200 foreign soil scientists, representing 33 European, Asiatic and American countries, will also be present.

After the adjournment of the formal sessions, there will be a 29-day excursion by rail and river boat and Black Sea steamer.

Soils Science

Science News-Letter, July 19, 1930

FIRST GLANCES AT NEW BOOKS

THE ST. LAWRENCE WATERWAY PROJECT—George Washington Stephens—*Louis Carrier & Co.,* 460 p., $7.50. The first canals along the St. Lawrence route, built more than one hundred years ago, were planned to be only twelve feet wide and eighteen inches deep. Primitive bateaux and Durham boats navigated them. Now the Welland Canal built by Canada carries vessels of twenty-five-foot draft and would lift and lower ocean-going vessels through its 325 feet if they could come in from the sea. The problem of whether the St. Lawrence and the Great Lakes should be made a 2,000-mile arm of the Atlantic piercing the heart of North America is ably presented, facts being drawn even from the days of the bateaux and Durham boats. The book is full of information on both sides; there are two contrasting tables which list reasons for and against the project.

Navigation
Science News-Letter, July 19, 1930

WHAT TREE IS THAT?—E. G. Cheney—*Appleton,* 189 p., $2. A revised edition of one of the most useful of books for the layman or the beginning student in dendrology. Several scores of the most common trees are taken up in order, each receives a terse paragraph of description of its identification characters, and each is illustrated with a simple, clear-cut outline drawing.

Dendrology
Science News-Letter, July 19, 1930

WONDER FLIGHTS OF LONG AGO—Mary Elizabeth Barry and Paul R. Hanna—*Appleton,* 219 p., $1. A reader for elementary schools containing accounts of such mythical flights as Pegasus and Bellerophon, Daedalus and Icarus, etc., intended to be related to the child's interest in actual flights of today.

Mythology
Science News-Letter, July 19, 1930

SOLID GEOMETRY — LEONARD D. Haertter—*Century,* 554 p., $1.40. An excellent text with frequent summaries, reviews and an abundance of exercises. It is a continuation of the author's "Plane Geometry," a summary of which is given at the beginning. A number of illustrations show the practical applications of the subject.

Geometry
Science News-Letter, July 19, 1930

A DICTIONARY OF COLOR — A. Maerz and M. Rea Paul—*McGraw-Hill,* 207 p., $12. A truly magnificent volume in which are given, in 56 colored plates, approximately 8,000 samples of colors, of which a thousand or more, having accepted names, are identified. The text discusses a number of these specifically, as well as other color problems. Anyone who has occasion to use color, and particularly anyone using color nomenclature, will find the work invaluable. The printers are to be congratulated in producing so successfully such a difficult job of color printing.

Color
Science News-Letter, July 19, 1930

A GENERAL SCIENCE WORKBOOK—Charles H. Lake, Louis E. Welton, James C. Adell—*Silver, Burdett,* 343 p., $1.40. The utilization of this auxiliary to the textbook in the teaching of general science should make the work less painful to both pupil and teacher, and more profitable to the pupil. The modern technique of sentence completion, born of psychological tests, is used freely in combination with more conventional questions and problems, involving both the reading of texts and the performing of experiments.

General Science
Science News-Letter, July 19, 1930

MOTHER WIT—Estelle H. Ries—*Century,* 301 p., $2.50. The growth of man's simple inventive ideas for improving his world and himself rather than the mechanical details of great inventions is the subject of this record of ingenuity. It takes us back to primitive and ancient times and carries forward through history, with many picturesque and entertaining incidents. The book thus provides long range perspective on our dining customs, our use of light and fire, our clothing, cleanliness, and other aspects of everyday life to which mother wit has brought comfort and satisfaction.

Invention
Science News-Letter, July 19, 1930

THE CANCROID CRABS OF AMERICA, OF THE FAMILIES EURYALIDAE, PORTUNIDAE, ATELECYCLIDAE, CANCRIDAE AND XANTHIDAE—Mary J. Rathbun—*Govt. Printing Office,* 609 p., 230 pl., $2. Of interest to students of marine zoology.

Zoology
Science News-Letter, July 19, 1930

THE CITY OF TOMORROW—Le Corbusier, translated from the 8th French edition with an introduction by Frederick Etchells—*Payson & Clarke,* 301 p., $7.50. A *moderne* architect plans the perfect City, with business housed in 24 (no more) skyscrapers set in a vast park. Subway stations in each skyscraper, 60-mile-an-hour safe highways, and ample parking space are some of the attractions. All habitations are banished to a suburban garden city.

Architecture
Science News-Letter, July 19, 1930

FLORA POLSKA, TOM IV: RUBUS L.—Witold Kuleszka—*Polish Academy of Sciences.* Dr. Kuleszka here monographs the species of *Rubus* that occur in Poland and adjacent regions. The book is in Polish; it is to be hoped that eventually the Polish Academy may be able to publish translations of these monographs into a Western European modern language or into Latin, to make them available to those of us for whom Slavic languages have proved too difficult.

Botany
Science News-Letter, July 19, 1930

THE PSYCHOLOGIST KEEPS HOUSE—Edwina Abbott Cowan and Laura Thornborough—*Midwest Co.,* 213 p., $2. A leisurely discussion of the home in its relation to modern life. The theme is brought to a practical turn at intervals by suggestions as to how psychological principles may be applied to the care of children and the management of the home.

Psychology
Science News-Letter, July 19, 1930

V. O. K. S.—*Soviet Union Society for Cultural Relations with Foreign Countries,* 118 p., $3 per year. With the purpose of acquainting foreign readers (of English, French and German) with the "cultural life and cultural development of the U. S. S. R., its five year plan of socialist economic reconstruction of the country on the basis of industrialisation and collectivisation" the Soviet Union Society for Cultural Relations with Foreign Countries has established this propaganda magazine. The January-February issue has articles on Soviet archæological expeditions during 1929, excavations in the Crimea, and descriptions of other scientific work and societies in the Soviet Union.

General Science
Science News-Letter, July 19, 1930

First Glances at New Books—*Continued*

RADIO AND ITS FUTURE—Edited by Martin Codel—*Harper,* 349 p., $4. To anyone who has wondered about how radio grew in a mere decade from a scientific infant to a billion dollar industry and public utility, the chapters of this book written by authorities in the various radio fields will come as a revelation. And even those within the field of radio will undoubtedly be able to obtain much information from the pages of this book. Broadcasting, point to point communication, radio as an industry, regulation of radio and the scientific fundamentals of radio are all given concise and interesting treatment in the various sections.

Radio
Science News-Letter, July 19, 1930

HEALTH OF HAITI—Kent C. Melhorn—*National Public Health Service of Haiti,* 175 p. The author, who is the director general of Haiti's public health service, has made his review of the health work for the fiscal year 1928-29 an interesting account of health conditions in that troubled island at the present time and also as they were before the national health service was reorganized in 1915 at the time of the United States intervention in the affairs of the country. Captain Melhorn is an officer in the Medical Corps, U. S. N.

Public Health
Science News-Letter, July 19, 1930

MASTERS' AND MATES' MANUAL OF NAVAL ARCHITECTURE—G. C. Manning—*Van Nostrand,* 183 p., $2.75. Not full of technical detail but containing clearly explained principles of ship architecture, this short manual will be interesting and valuable both to those who have to do with ships and to those who have a mind ever inquisitive for engineering knowledge. It was written especially for officers and men of the merchant marine.

Naval Architecture
Science News-Letter, July 19, 1930

NINTH YEAR MATHEMATICS—Ernst R. Breslich—*Macmillan,* 319 p., $1.20. A text for use in the first year high school that combines advanced arithmetic, algebra (including quadratic equations), elementary trigonometry, the use of logarithms and the slide rule, etc. Such a general course would seem to give the student a good basis for further advanced work.

Mathematics
Science News-Letter, July 19, 1930

MINERAL RAW MATERIALS—*U. S. Department of Commerce,* 278 p., 45c. An economic presentation of the source of 80 per cent. of the world's production of minerals, including 28 different minerals. They come from only eight countries—the United States, Germany, France, United Kingdom, Japan, Belgium, Italy, and Spain. The authors are J. W. Furness, chief of the Minerals Division of the Bureau of Foreign and Domestic Commerce, and L. M. Jones, of the Bureau of Mines, assisted by F. H. Blumenthal, of the Minerals Division.

Minerology—Economics
Science News-Letter, July 19, 1930

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MYTHS OF THE ORIGIN OF FIRE—Sir James George Frazer—*Macmillan,* 238 p., $4.50. Every people that the earth has ever known has had its Prometheus. Fire myths are perhaps the most universally distributed of all folk beliefs. Their correspondences and differences can be used by ethnologists in tracing the history of peoples, and their concepts of the nature of the hero and his relation to the gods are of service to the student of comparative religions. One of the foremost of the world's scholars of mythology here assembles the most outstanding types of fire-origin myths, again placing the scientific public in his debt.

Mythology
Science News-Letter, July 19, 1930

AMERICAN STANDARDS YEAR BOOK 1930—*American Standards Association,* 301 p., 75c. The standardization efforts of 43 national technical societies, trade associations, and governmental bodies come to a focus in the American Standards Association. Its year book is a guide to standardization activity here and abroad. Up to the present time, the Association has approved 166 standards and projects for 171 other standards are under way.

Standardization
Science News-Letter, July 19, 1930

FORESTRY IN SWEDEN AND ADJACENT LANDS—George Sargent Perry—*Author,* 276 p., $2.50. The author, who spent a year in Sweden as Forestry Fellow of the American-Scandinavian Foundation, here gives his fellow-Americans the benefit of what he learned there. He goes into such aspects of the question as forest policy, economics, administration, etc. While this country may not yet be ready for the intensive phase of forest development and use that now prevails in the Baltic countries, we shall probably be confronted with the necessity some day, and studies such as those of Prof. Perry will help to prepare us.

Forestry
Science News-Letter, July 19, 1930

THE PROVINCE OF NEW BRUNSWICK, CANADA: ITS NATURAL RESOURCES AND DEVELOPMENT—L. O. Thomas—*Department of the Interior (Canada),* 167 p. Coming from an official source, this booklet is much more dignified and solid than ordinary "booster" literature. It will be of interest to many people in "the States" as well as to those under the British flag.

Conservation—Development
Science News-Letter, July 19, 1930

SONGS OF SCIENCE: AN ANTHOLOGY—Edited by Virginia Shortridge—*Marshall Jones,* 245 p., $3.50. Miss Shortridge has combed many recent and some earlier sources for verse with some bearing or other on the sciences, and the result is a credit to her selective judgment and her critical faculty. Her poets range all the way from Francis Thompson to Berton Braley, and their moods all the way from brooding questions of the future to triumph in the mechanical achievements of the present.

Poetry
Science News-Letter, July 19, 1930

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